

Aircraft and UAS Quantum Key Distribution, Phase I

Completed Technology Project (2018 - 2019)



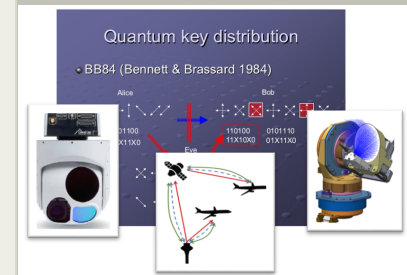
Project Introduction

We propose to enhance our existing compact optical communications terminal, initially developed under a NASA Select SBIR program, by adding the capability for Quantum Key Distribution (QKD). The addition of QKD ensures secure transmission of encryption keys for encrypted communication with unmanned arial systems. This UAS QKD system could also be used to share keys between two ground locations, allowing point-to-point communication with the security of quantum distributed keys without the necessity of a dedicated fiber-optic connection for QKD. Similarly, the system could be adapted for a satellite, allowing key distribution for secure communication over very long distances. Without the need for a physical link this could provide the security of QKD for remote field applications where a physical link is not possible. There have been limited demonstrations of free-space optical QKD demonstrations and Fibertek's approach implements several novel techniques to increase the key transfer rate and simplify the hardware implementation on the transmitter and receiver compared to previous demonstrations.

Anticipated Benefits

NASA identified QKD as a revolutionary concept in the 2015 NASA Technology Roadmap Technology Area 5.6 Revolutionary Concepts. Revolutionary concepts are those technology ideas that are on the cutting edge that are both high risk, but high payoff if they materialize. NASA identified QKD as key enabling technology providing a stepping stone for quantum communications. Quantum communications technology can potentially be integrated with optical communications systems like Fibertek's FSO terminal.

Secure communication is a fundamental need in nearly all aspects of today's society, e.g., finances, industry, defense, and social media. QKD provides a fundamentally secure key transfer protocol that when implemented correctly provides absolutely secure key transfers based on the laws of quantum mechanics. As such, all the major Department of Defense services have active quantum communications programs.



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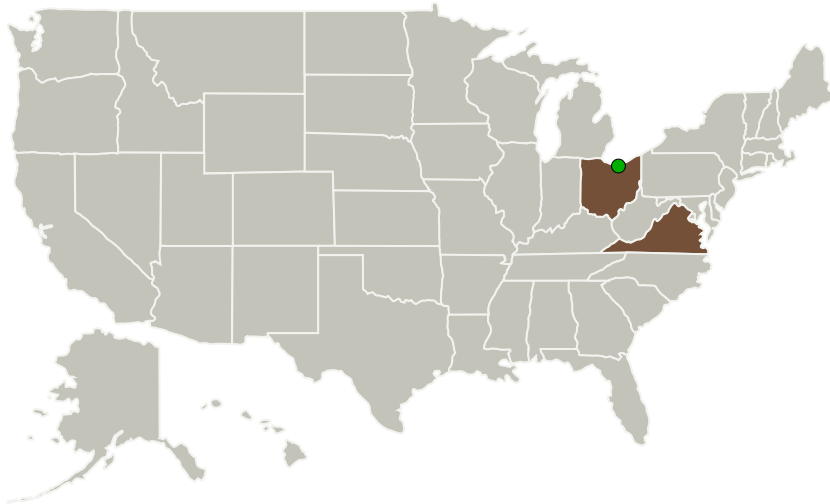
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Fibertek, Inc.	Lead Organization	Industry	Herndon, Virginia
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141259>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Fibertek, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

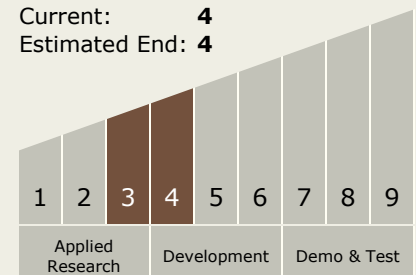
Carlos Torrez

Principal Investigator:

Michael Albert

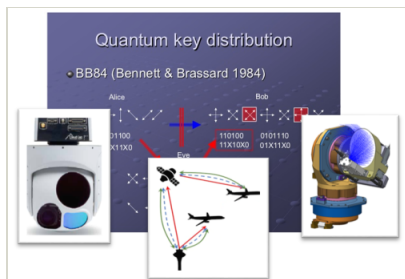
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**





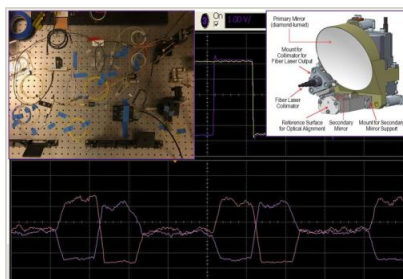
Images



Briefing Chart Image

Aircraft and UAS Quantum Key Distribution, Phase I

(<https://techport.nasa.gov/image/130996>)



Final Summary Chart Image

Aircraft and UAS Quantum Key Distribution, Phase I

(<https://techport.nasa.gov/image/134428>)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.5 Revolutionary Communications Technologies
 - └ TX05.5.2 Quantum Communications

Target Destination

Earth